



Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

December 23, 2002

L-2002-238  
10 CFR § 50.73

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D. C. 20555

Re: St. Lucie Unit 1  
Docket No. 50-335  
Reportable Event: 2002-002-00  
Date of Event: October 24, 2002  
Manual Reactor Trip on Low Steam Generator Water Level

The attached Licensee Event Report 2002-002 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

Donald E. Jernigan  
Vice President  
St. Lucie Nuclear Plant

DEJ/KWF

Attachment

IE22

**LICENSEE EVENT REPORT (LER)**(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

St. Lucie Unit 1

DOCKET NUMBER (2)

05000335

PAGE (3)

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TITLE (4)

Manual Reactor Trip on Low Steam Generator Water Level

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	24	2002	2002	- 002	- 00	12	23	2002	FACILITY NAME	DOCKET NUMBER
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)										
OPERATING MODE (9)		1	20 2201(b)		20 2203(a)(3)(ii)		50 73(a)(2)(ii)(B)		50 73(a)(2)(x)(A)	
POWER LEVEL (10)		6	20 2201(d)		20.2203(a)(4)		50 73(a)(2)(iii)		50.73(a)(2)(x)	
			20.2203(a)(1)		50.36(c)(1)(i)(A)		X 50 73(a)(2)(iv)(A)		73 71(a)(4)	
			20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50 73(a)(2)(v)(A)		73 71(a)(5)	
			20.2203(a)(2)(ii)		50.36(c)(2)		50 73(a)(2)(v)(B)		OTHER	
			20 2203(a)(2)(iii)		50 46(a)(3)(ii)		50 73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A	
			20 2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)			
			20 2203(a)(2)(v)		50 73(a)(2)(i)(B)		50.73(a)(2)(vii)			
			20 2203(a)(2)(vi)		50 73(a)(2)(i)(C)		50 73(a)(2)(viii)(A)			
			20 2203(a)(3)(i)		50 73(a)(2)(ii)(A)		50 73(a)(2)(viii)(B)			

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Kenneth W. Frehafer, Licensing Engineer

TELEPHONE NUMBER (include Area Code)

(561) 467 - 7748

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	TG	XC	W120	YES	-	-	-	-	-

## SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 24, 2002, St. Lucie Unit 1 was in Mode 1 at approximately 6 percent reactor power during power ascension at the end of refueling outage SL1-18. Attempts to "latch" the turbine were unsuccessful, and the resultant turbine trip signal drove the 15 percent main feedwater bypass valves to the post-trip position. Steam generator levels rose and the operating main feedwater pump tripped on high steam generator water level. The operators tripped the reactor when the steam generator water levels dropped below the procedural trip requirements during the efforts to restore feedwater.

The cause of this event was the failure of the turbine valves to latch and latent procedural weaknesses in that the adverse consequences of a "partial latch" condition were not addressed. The failed turbine latch initiated the chain of events that ultimately led to the manual reactor trip.

Corrective actions include the completed repair of the turbine front standard latch function, procedure enhancements, continuing training, and potential plant modifications to the 15 percent main feedwater bypass valve controller.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

## Description of the Event

On October 24, 2002, St. Lucie Unit 1 was in Mode 1 at approximately 6 percent power. The operating crew was in the process of "latching" the turbine prior to placing the unit on line following the SL1-18 refueling outage. The 1B main feedwater pump [EIIS:SJ:P] was running in the recirculation mode, the 15 percent main feedwater bypass valve controllers [EIIS:SJ:FIC] were in AUTO, and steam generator water levels were being controlled between 60-67 percent.

The operating crew was attempting to latch the turbine from the control room. Two attempts to latch the turbine were unsuccessful and the reheat and intercept valves failed to remain open following the attempts. An attempt to latch the turbine locally from the turbine front standard was also unsuccessful.

Following these turbine latch attempts, the reactor operator at the feedwater control station noted that both steam generator water levels were increasing rapidly. Manual control of the 15 percent main feedwater bypass control valves was attempted but the operators were unable to stop the rise in steam generator water level. At this point, the crew realized that the partial latching of the turbine must have driven the 15 percent main feedwater bypass control valves to their post-turbine trip position (approximately 5 percent of full feed flow). There is no positive indication that the controllers are in their designed post-trip position. The 15 percent main feedwater bypass control valve's "override pushbuttons" were depressed and control of the valves was restored to the controller at the feedwater station. However, due to steam generator swell, levels continued to rise and the 1B main feedwater pump automatically tripped when the steam generator water levels exceeded the high-high steam generator level setpoint.

Subsequent efforts to restart the 1B and 1A main feedwater pumps and restore feedwater flow were unsuccessful because the main feedwater pump discharge valves failed to open. During the efforts to restore main feedwater, steam generator water levels decreased to the point that 2 of 4 channels indicated levels less than the procedural manual trip criteria. At this point the operators manually tripped the reactor. Auxiliary feedwater flow was initiated and the plant was stabilized in Mode 3. All safe shutdown systems responded to the trip as required.

Following the event a critique of operating crew performance was conducted. Several deficiencies were noted. The initial indication of rising steam generator levels was not communicated immediately to the entire crew. The potential failure mechanism of the feedwater controllers during turbine latch operation was not anticipated and subsequent diagnosis of the failure was not timely. In general, crewmembers were slow to exchange complete and relevant information and a team approach to problem solving was not clearly evident.

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**Cause of the Event**

The cause of this event was the failure of the turbine valves to latch combined with a latent procedural weakness in that the adverse consequences of a "partial latch" condition were not addressed. During the latch attempts, the increase in turbine control system oil pressure was sufficient to arm the turbine control logic that generates a signal to the feedwater control system on a turbine trip. On release of the turbine latch pushbutton, control oil pressure decreased below the setpoint of the turbine trip logic, and a turbine trip signal was sent to the feedwater control system. This turbine trip signal drove the 15 percent main feedwater bypass valves to the post-turbine trip position. This initiated the steam generator over-feed condition that started the chain of events that ultimately lead to the manual reactor trip.

Contributing factors include weak crew performance, the failure of "just-in-time" simulator training to cover this potential failure mode during turbine latching, and the lack of direct information to the control room operators regarding the status of the 15 percent main feedwater bypass valve controllers.

**Analysis of the Event**

This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) as any event or condition that resulted in manual or automatic actuation of the reactor protection system.

The turbine front standard local latch malfunction was caused by mechanical binding in the DEH [E1IS:TG:XC] oil interlock box and has been corrected by Maintenance. The inadequate turbine latch remote pushbutton response is still under investigation. The main feedwater pump discharge motor operated valves (MOVs) stalled when opening because ongoing sample streams depressurized piping downstream of the MOVs, thereby causing a high differential pressure condition across the valves.

The 15 percent main feedwater bypass valve controller response to a turbine trip signal is by design. The automatic repositioning of the 15 percent feedwater bypass valves provides enough feedwater post-trip to remove decay heat and prevent an excessive cooldown event. However, recovering manual control of the 15 percent main feedwater bypass valves requires that the controller be reset by the override pushbuttons. The need to reset the controller is not indicated or annunciated to the control room operating crew. The 15 percent main feedwater bypass valve controller design is shared with St. Lucie Unit 2, and any potential corrective actions planned for St. Lucie Unit 1 controller are applicable to the other unit.

**Analysis of Safety Significance**

Reactor trips are analyzed events, and safe shutdown equipment responded per design. Therefore, this event had no adverse effect on the health and safety of the public.

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**Corrective Actions**

1. St. Lucie implemented procedure changes to place cautionary notes prior to turbine latching steps in Operations procedures.
2. The turbine front standard local latch malfunction, that was caused by mechanical binding in the DEH oil interlock box was corrected.
3. A work request was initiated for repair of the control room remote latch function. In addition, St. Lucie is evaluating the current practice of performing turbine latching from the control room and will pursue procedure or hardware changes, as appropriate.
4. St. Lucie will include this event in scheduled 2003 human performance training.
5. St. Lucie is developing an outage evolution "just-in-time" training list that will be included as scheduled Operations outage activities. This event will be discussed during this training.
6. St. Lucie is evaluating potential plant modifications for both St. Lucie units to provide either direct indication or annunciation of the status of the 15 percent main feedwater bypass valve controller.

**Additional Information**Failed Components Identified

Westinghouse Turbine DEH Controller

Similar Events

LER 50-389/1999-007-00, "Personnel Error During Reactor Startup Led to Unplanned Cooldown Transient."